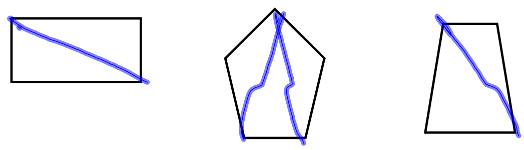
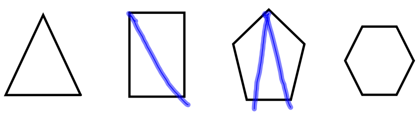
Chapter 8 Quadrilaterals

8-1 Angles of a Polygon

diagonal--segment that connects nonconsecutive vertices

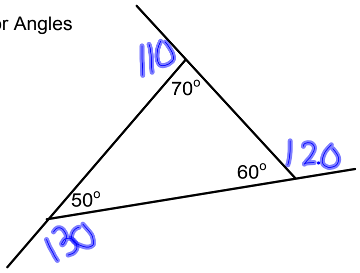




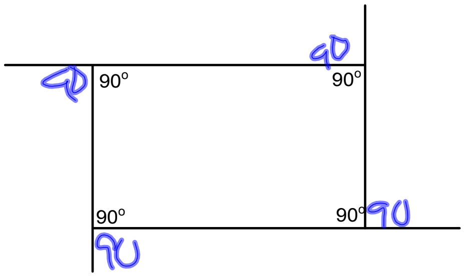
sides	3	4	5	6	n
# of $\triangle$s	1	2	3	4	(n-2)
degrees	180	360	540	720	

Theorem 8.1 Interior Angle Sum Theorem
In a convex polygon with n sides, the sum of the interior angles is (n-2)180.

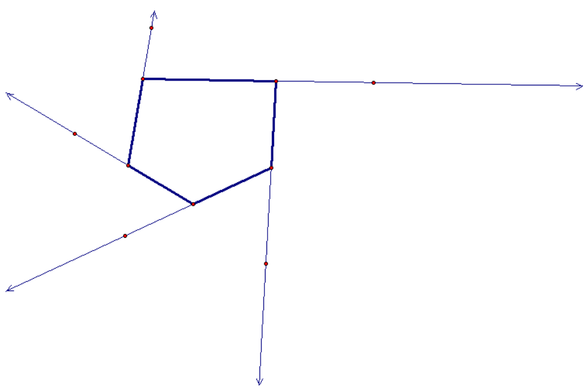
Exterior Angles

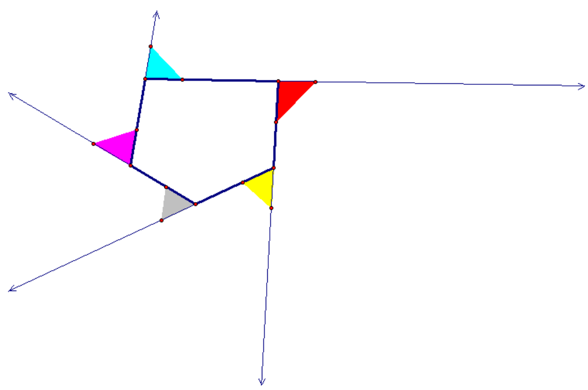


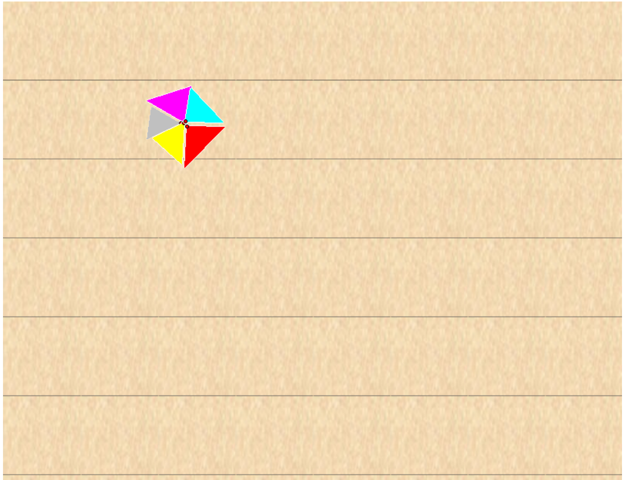
110
120
+130
360

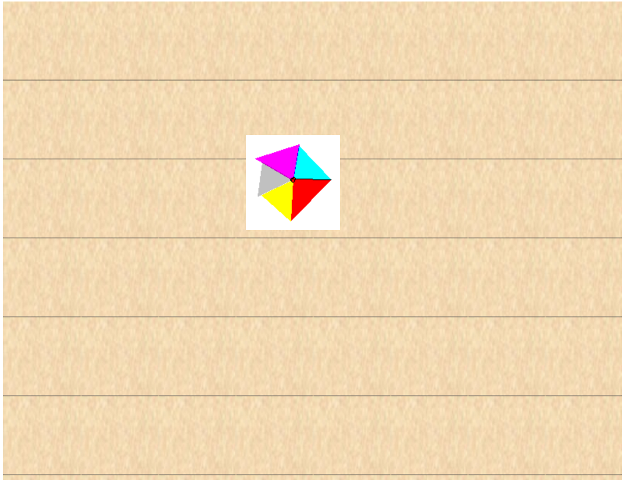


90
x 4
360



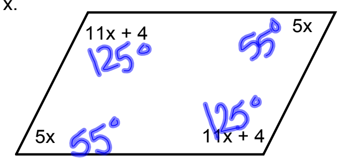






Theorem 8.2 Exterior Angle Sum Theorem--
In a convex polygon, the sum of the measures of the exterior angles, one at each vertex, is 360^{o}.

Solve for x.

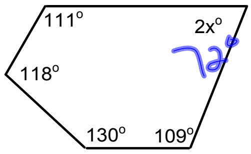


$(4-2)180$

$2(11x+4)+2(5x) = 360$

$x = 11$

Solve for x.



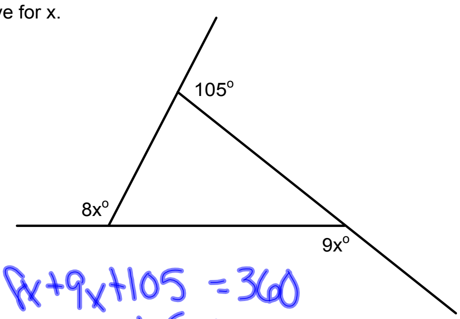
$(5-2)180$

$2x+109+130+118+111=540$

$2x+468=540$

$x=36$

Solve for x.



$8x+9x+105=360$

$17x+105=360$

$x=15$

Regular Polygon--Both equilateral and equiangular

n	6
interior angle sum	$(6-2)180=720°$
exterior angle sum	$360°$
<u>Regular</u> each interior angle	$\frac{720}{6}=120°$
each exterior angle	$\frac{360}{6}=60°$

supp.

n	10
interior angle sum	$(10-2)180 = 1440^\circ$
exterior angle sum	360°
Regular each interior angle	$144^\circ = \frac{1440}{10}$
each exterior angle	36° $\frac{360}{10}$

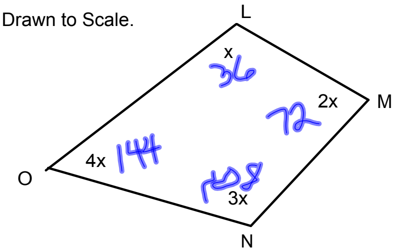
n	$360 \div 24^\circ = 15$
interior angle sum	$(15-2)180 = 2340^\circ$
exterior angle sum	360
Regular each interior angle	156°
each exterior angle * find 1st	$180 - 156 = 24^\circ$

n	$360 \div 12 = 30$
interior angle sum	$(30-2)180 = 5{,}040^\circ$
exterior angle sum	360
Regular each interior angle	168°
each exterior angle	$180 - 168 = 12^\circ$

n	27 $360 \div 13\frac{1}{3}$ $360 \div \frac{40}{3}$ $36\cancel{0} \times \frac{3}{4\cancel{0}} =$
interior angle sum	4500°
exterior angle sum	360°
Regular each interior angle	$166\frac{2}{3}^\circ$
each exterior angle	$13\frac{1}{3}^\circ$

DO:	#1	#2
n	12	24
interior angle sum	1800°	3960°
exterior angle sum	360°	360°
Regular each interior angle	150°	165°
each exterior angle	30°	15°

Not Drawn to Scale.



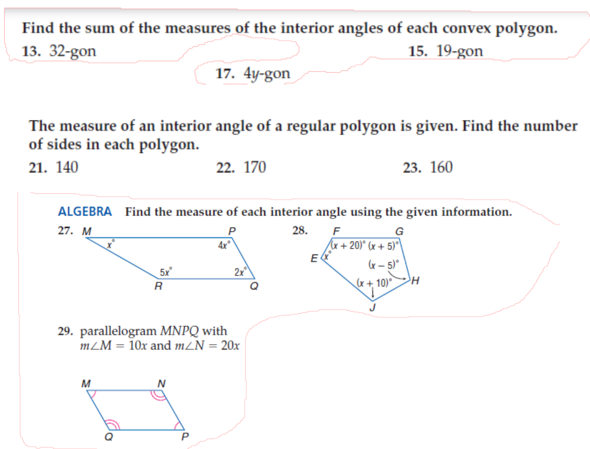
Which sides are parallel?

$10x = 360$

$x = 36$

$\overline{LM} \parallel \overline{ON}$

HW
p407-408
13, 15, 17, 21-23, 27-29, 31, 32, 34, 37-40



Find the sum of the measures of the interior angles of each convex polygon.

13. 32-gon **15.** 19-gon

17. $4y$-gon

The measure of an interior angle of a regular polygon is given. Find the number of sides in each polygon.

21. 140 **22.** 170 **23.** 160

ALGEBRA **Find the measure of each interior angle using the given information.**

27. M P R Q $x°$ $4x°$ $5x°$ $2x°$

28. F G H J E $(x + 20)°$ $(x + 5)°$ $(x - 5)°$ $(x + 10)°$ $x°$

29. parallelogram $MNPQ$ with $m\angle M = 10x$ and $m\angle N = 20x$

M N Q P

31. decagon in which the measures of the interior angles are $x + 5$, $x + 10$, $x + 20$, $x + 30$, $x + 35$, $x + 40$, $x + 60$, $x + 70$, $x + 80$, and $x + 90$

32. polygon $ABCDE$ with $m\angle A = 6x$, $m\angle B = 4x + 13$, $m\angle C = x + 9$, $m\angle D = 2x - 8$, and $m\angle E = 4x - 1$

34. quadrilateral in which the measure of each consecutive angle increases by 10

Find the measures of each exterior angle and each interior angle for each regular polygon.

37. nonagon **38.** octagon

Find the measures of an interior angle and an exterior angle given the number of sides of each regular polygon. Round to the nearest tenth if necessary.

39. 11 **40.** 7